Regional Science and Urban Economics 13 (1983) 471–486. North-Holland

THE DETERRENCE HYPOTHESIS REVISITED

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Received April 1983, Final version received April 1983

This study explores the causes of crime and the differences in deterrent effects of policing on crimes among rural, suburban, and urban communities. We hypothesize that certain numbers of all crimes are unaffected by policing due to their high net return; policing deters only marginal crimes. That is, unlike other research efforts, we recognize that there is a level of crime indigenous to a given type of community about which little can be done, although a particular community can affect deviations from this level. By introducing this 'natural rate' of crime we are able to empirically reveal the deterrence effect of police expenditures upon all types of property crimes except robberies. The study analyzes 230 communities in a system of six simultaneous equations, using police, crime, and other socio-economic variables. The model can be used by state and regional policy-makers to more effectively allocate resources to the different types of communities under their jurisdiction and among the various police functions designed to deter specific types of crime.

1. Introduction

Criminologists and economists have long been concerned with the deterrence of crime, and with the determinants of police outlays in various types of communities [Hoch (1974)]. Empirical estimations of crime functions are usually based upon the theoretical model developed by Becker (1968) and Ehrlich (1973) which both explain the supply of crime. The police expenditure function, which is drawn from the public finance framework, explains the demand for police protection [Phillips (1978), McPheters and Stronge (1974)]. Sometimes other equations, such as a production function for police operations and the effect of police in deterring criminal activities, are incorporated to reveal the degree to which police efforts deter crime [Thaler (1977)]. Interestingly, most empirical studies do not reveal the deterrent effect of policing on all types of crime. Several theoretical and empirical explanations are given for the consistent lack of deterrence exhibited in both partial and general equilibrium statistical models [Allison (1972), Greenwood and Wadycki (1973), Zipin et al. (1974), Hakim et al. (1978)].

In this study we develop a general equilibrium econometric model to analyze the following questions: Is police presence (input) or its performance (output) more effective in deterring criminal activities? Are there significant differences in crime level and the efficiency of police deterrence among urban, suburban, and rural communities? The answers to these questions will suggest policy recommendations concerning the allocation of resources for police operations by local and state governments.

In this research, we hypothesize that property crimes have features similar to unemployment [Friedman (1968)]. A natural rate of unemployment exists in the long run and is the result of given structural (sectoral and institutional) features of the economy, and the frictional effects of workers searching for new jobs. Any demand management policies which increase aggregate demand (inflationary measures) will reduce short-run unemployment, but have no long-run effect on the natural unemployment rate.

Likewise, a given level of property crime exists in the long run and depends inter alia upon the high net return of some crimes, the structural socio-economic characteristics, disparities in the distribution of wealth and income, psychological factors, environmental factors, and the inflow of new criminals to the region. The number of crimes committed in the short run is affected by police outlays and effectiveness, temporal socio-economic conditions like unemployment, percent of young males, and the turnover of the population. The thrust of our argument is that the expected net return on some property crimes is so high that any feasible increase in police surveillance would not substantially diminish the number of crimes. Thus, police activities have no effect on the long-run natural rate of crime, but it has a short-run effect on marginal crimes. The explicit introduction of the natural rate of crime, which has never been included in previous studies, might reveal the deterrent effect of police outlays on crime in the short run.

The next section of this paper presents the conceptual model, and the third section introduces a Three Stage Least Squares (3SLS) empirical model and discusses the theory and rationale for the various variables included in the model. Section 4 presents and discusses the results, and the last section summarizes the major findings and suggests some policy implications.

2. The model

Policy-makers in the community assume that the returns from crime, the severity of punishment and alternative opportunities to crime are exogenous to their control. However, in order to dictate crime levels, they can exercise their power over the certainty of punishment. In particular, police can affect the apprehension, clearance, charge, and conviction rates by changing the amount spent on policing, and therefore changing the net expected return to offenders as expressed in their utility function.

From the aspect of demand for security, localities decide how much to spend on policing, depending upon their budget and the marginal social returns of policing vis-a-vis other public services. As a result, a community might choose to tolerate a certain level of crime if the social cost of controlling it exceeds the benefit of eliminating it. Police operations are not usually sufficiently extensive to eliminate all crimes.

The supply of crime is assumed to reflect the rational behavior of individuals who are potential offenders. An offense is committed if the expected returns exceed the costs involved [Becker (1968)]. Thus, we can obtain a supply function of crime by aggregating all offenses committed in a community and ranking them in declining order according to their expected net return to the offenders.

By combining demand and supply we conclude that police activity might deter only marginal crimes at the 'bottom' of the crime ordering. Thus, the crimes with high net returns basically unaffected in the long as well as the short run by conventional police outlays. These crimes are included in the category which we define as the natural level of crime. Their level is determined by the existing social structure which is the main determinant of the criminal population. We hypothesize that the net expected returns on most crimes are very high and provide a substantial incentive to people who are willing to be involved in illegal activity. Any attempt by police to significantly reduce crime levels by reducing net expected returns would probably require levels of expenditure that are not feasible for most or all local governments. This analysis is valid for all four types of property crimes motivated by the profit-maximization attitude of offenders: burglaries, robberies, vehicle thefts, and larcenies.

Other interesting recent literature in criminology suggest interdependence among the various types of property crime. Reppetto (1976) argues that offenders react to certain crime-prevention measures by shifting their activity from one type of crime to another. Hence, in an open criminal market, we assume: First, offenders are free to shift among various types of property crime; i.e., mobility of offenders among crime exists if the net return is expected to rise. Second, no transaction costs are associated with that transfer; for example, no training costs or psychological barriers to the offender are caused by a voluntary shift from one crime to another. And third, offenders have perfect knowledge of the net return for all property crimes in all locations. If these three conditions are met, then in an equilibrium situation we could expect that the marginal expected net return is equalized within and across all types of property crimes in the community.

To sum up, our hypothesis consists of two components. The first component assumes the existence of a natural level of crime, where the fluctuations from this level are caused by conventional crime-prevention policies. The second component implies that property crimes are substitute (or complimentary) goods. Greater police efforts against one crime increase or decrease the level of other crime(s), respectively. Hence, the natural rates of all property crimes are interdependent. The functional form which relates the level of each type of crime to all other property crimes is

$$C_i = f_i\left(\sum_j C_j\right), \qquad (1)$$

where $i, j = B, L, RB, VT$, and $i \neq j$ (see table 1 for definition of symbols). This functional form is based on the above three assumptions and the hypothesis that in the long run the natural rate of all property crimes are interdependent and exhibit an equal marginal net return. Any deviation from this pattern is explained by the type of community, its physical and socio-economic profile, the dynamics of its population, and by the effectiveness of its police.[1] The interdependence among crimes is hypothesized to exist only among the four types of property crimes.

3. The empirical model

We have chosen to test the effects of police expenditure on the fluctuations of the different property crimes from their natural level with a Three Stage Least Squares (3SLS) technique. This general equilibrium econometric system assumes the interdependence of all the dependent variables and is suitable to detect potential differences among urban, suburban, and rural communities.

In order to differentiate the effect of key factors on crime levels by the three groups of localities, we chose to use a technique originally suggested by Searle (1971, pp. 355–358) and later applied by Hakim (1980). This technique transforms the original variable to its deviation from each group's mean.

[1]Operationalizing eq. (1) implies the use of a concept similar to that employed in rational expectation theory. In choosing among the four types of crimes and j communities, criminals all possess the same long-run information. The level of each type of crime is based on the same information set for all communities. Hence, the long-run level of the ith type of crime depends on the remaining three. This is a cross-section analogy to using past money growth rates to forecast future growth rates.

Each treated original variable is transformed into three new variables where zero values appear in each variable for the cases in two of the groups. Hence, the covariance between each pair of newly created variables is zero. This enables us to observe the independent effect of that variable for each of three groups without splitting the sample for the other variables which are not hypothesized to exhibit a different group behavior. Furthermore, this technique eliminates multicollinearity among the newly formed variables and also between them and the dummy variables which indicate the type of community (DS, DU).

The empirical model consists of six simultaneous equations. The typical property crime equation is given by

$$(C_i)_E = f_i(PSM_h, \text{ crime costs, crime opportunities, environmental variables}), \tag{2}$$

where $h = U, S, R$, and

$$(C_i)_E = C_i - \hat{C}_1, \tag{3}$$

$$\hat{C}_i = f_i\left(\sum_j C_j\right), \tag{4}$$

where $i, j = B, L, RB, VT$, and $i \neq j$. In other words $(C_i)_E$ are the computed residuals derived from the estimation of eq. (4).

The rest of the model is completed by the violent crime equation, given by

$$VC = f_{vc}(PSM_h, \text{ criminal cost, socio-economic profile}), \tag{5}$$

and the police expenditure function given by

$$PSM = f_{psm}((C_i)_E, VC, \text{ fiscal capacity, environmental variables}). \tag{6}$$

Table 1 presents all the variables analyzed in the simultaneous equations model (3SLS model). Violent crimes (VC) include assault, murder and rape standardized by the population in order to express the intensity of these criminal occurrences. We define property crimes as burglaries (B), larcenies (L), robberies (RB), and vehicle thefts (VT). All these crimes are motivated by economic incentives rather than by passion, regardless of the targeted victims.[2]

The theoretical considerations underlying the choice of the independent

[2]Criminologists usually define robberies as violent crimes. Since the motive of robberies is to gain economic profits, we chose to define it as a property crime.

Table 1

List of variables.[a]

Crime variables

B	= number of burglaries per number of year-round dwelling units
C_i	= general notation for property crimes ($C_i = B, L, RB, VT$)
L	= number of larcenies per square mile
RB	= number of robberies per square mile
VC	= per capita violent crimes
VT	= number of vehicle thefts per square mile

Arrest rates variables

AB	= percent of burglaries cleared by arrest
AC_i	= general notation for arrest rates ($AC_i = AB, AL, ARB, AVC, AVT$)
AL	= percent larcenies cleared by arrest
ARB	= percent robberies cleared by arrest
AVC	= percent violent crimes cleared by arrest
AVT	= percent vehicle thefts cleared by arrest

Socio-economic variables

POV	= percent of families below poverty level
UN	= rate of unemployment
Y	= percent males 15 to 24 of total population

Municipal characteristics variables

DEN	= population density per square mile
DS	= dummy variable indicating suburban communities
DU	= dummy variable indicating urban communities
MED	= median house value
MOB	= percent mobile homes of all year around dwelling units
PCA	= per capita police expenditure
PCH	= percent change of population between 1960 and 1970
PSM	= expenditure on police per square mile
SIN	= percent single-family homes of all year around units
$W1$	= state equalized real estate valuation per square mile
$W2$	= state equalized residential (including apartments), and commercial land use per square mile

Subscripts

R	= rural communities (53 cases)
S	= suburban communities (150 cases)
U	= urban communities (27 cases)
E	= denotes those crime rates constructed from residuals found by regressing each property crime on the remaining three crime rates, e.g. $(B)_E = B_i - \hat{B}_i$ where $\hat{B}_i = a + b_1 L + b_2 RB + b_3 VT$. This construction reduces collinearity between the crime rates in the expenditure equation.

Group variable construction

PSM, DEN and POV were also used as triplets corresponding to each group (U, S, R) and measured as deviations from group mean, e.g.,

$(PSM)_U^i = (PSM_U^i - \overline{PSM}_U) * DU$, or $(PSM)_S^i = (PSM_S^i - \overline{PSM}_S) * DS$, or

$(PSM)_R^i = (PSM_R^i - \overline{PSM}_R * ((1 - DU) * (1 - DS))$

where $\overline{PSM}_U$ is $\overline{PSM}_S$ and $\overline{PSM}_R$ are the means of police expenditure per square mile for urban, suburban and rural communities, and PSM_U^i, PSM_S^i and PSM_R^i are police expenditure per square mile in the ith urban, suburban and rural community, respectively. This has the advantage of constructing sets of uncorrelated variables and also reducing collinearity between these new variables and the remaining independent variables.

[a]All data refers to 1970.

variables in the crime equations are based upon the net expected utility function derived from Becker's approach (1968) and are as follows:

PSM (police expenditure): Indicates the intensity of policing in the municipality. Since most police departments spend most of their budget on manpower, patrol cars and equipment maintenance, and the proportion spent for nonpatrol personnel and other capital maintenance is very small, it is reasonable to assume that police expenditure is a good proxy for the level of police activity. We expect that $\partial Ci/\partial PSM < 0$.

DEN (density): Previous research has shown that crime is positively related to density [Hoch (1974)]. The effect of population density on the level of crime is not unambiguous. On the one hand the higher the density, the greater the probability of being noted while committing the crime, and the higher the probability of apprehension. Thus, assuming that offenders are rational we expect that $\partial Ci/\partial DEN < 0$. On the other hand, the higher the density, the more interactions occur among people which lead to criminal activities, and the larger the stock of criminals. Moreover, the higher the density, the greater the economic opportunity for offenders [Loeb and Lim, (1981)], and therefore, in this case we expect that $\partial Ci/\partial DEN > 0$. Hence, the estimated coefficient might indicate the net effect of the two opposite hypotheses. It is important to note however, that the theoretical link between crime and density has not yet been established [Roncek (1975)].

POV (poverty): This population group is considered to be prone to criminal activities due to the low opportunity costs of legitimate employment. Thus we expect that $\partial Ci/\partial POV > 0$.

W2 (residential and commercial wealth): Includes the value of establishments which might attract property offenders. The true (market) value of real estate is calculated by dividing the assessed valuation of the developed area by the state equalization ratio. The value of developed property used in municipal assessment for taxation purposes differs over communities. However, the state equalization ratio corrects for these differences. The higher the real estate concentration, the more property it represents, and the higher the expected illegal payoff for the criminal. Hence, the increase in the magnitude of *W2* reflects greater wealth and consequently more crime opportunities. The expected sign is $\partial Ci/\partial W2 > 0$.

MED (housing value): This variable substitutes for *W2* in the burglaries equation. Potential burglars are influenced by the exterior value of a house in their evaluation of the potential value of goods inside. We expect that $\partial B/\partial MED > 0$.

UN (unemployment): This economic group is considered to be most inclined to larcenies since the opportunity cost of its members in the legal employment market is limited. The expected sign is $\partial L/\partial UN > 0$.[3]

[3]This implies the assumption that most unemployment comes in long spells, consistent with recent empirical evidence.

SIN (single homes): Single family homes are attractive to burglars due to their relative isolation in relation to other forms of housing, hence reducing the criminal's probability of apprehension. The expected sign is $\partial B/\partial SIN > 0$.

MOB (mobile homes): People residing in mobile homes are usually transient, less established and not accepted in the community. Thus, they are more susceptible mostly to burglaries. The expected sign is $\partial B/\partial MOB > 0$.

AC_i (apprehension): The apprehension rate expresses the effectiveness of policing. From Becker's model (1968) and other research [Thaler (1977) Furlong and Mehay (1981)], we learn that the rate of apprehension acts to deter crimes. The expected sign is $\partial Ci/\partial ACi < 0$.

It is interesting to note the observed empirical difference between *PSM* and AC_i. *PSM* expresses police intensiveness (input measure) while AC_i expresses police effectiveness (output measure). An interesting research question, which we attempt to answer below, is whether criminals are more concerned with police presence and visibility (*PSM*), or rather more with the product of police activities (AC_i).

DU and *DS* (urban, suburban dummy variables): Given that all variables which influence criminal behavior are the same for all three types of communities (urban, suburban, and rural), we still observe differences in the level of crime for the three groups necessitating group dummy variables.

The following are the theoretical considerations for the independent variables included in the police expenditure function:

VC and C_i (violent and property crimes): Local policy-makers have different concerns about violent crime and property crimes. Police activities are less effective where crimes of passion are concerned. Violent crimes are affected very little by the deterrent effects produced by police surveillance. However, where property crimes are concerned we hypothesize that offenders respond to policing activities because it enters as a cost item in their net expected return utility function. This fact is realized by local decision-makers who adjust their police expenditures according to property crime rates. The expected signs are $\partial PSM/\partial VC > 0$, and $\partial PSM/\partial C_i > 0$.

DEN (density): The higher the density, the more expensive it is to provide the same level of police protection. This is because higher density limits the visual range of the patrolman, and as a result the practice of one patrolman in a car, common in open areas, must give way to two patrolmen in a car. Also, with the increase in density and limited visual range, more frequent police rounds are necessary in order to provide the same level of security [President's Commission, (1967)]. The expected sign is $\partial PSM/\partial DEN > 0$.

PCH (population change): The higher the percent of population change the less stable the community, and hence its residents are less concerned about the level and quality of all public services, including police. As the community stabilizes and the residents become more familiar with the incidence of crime and their identification with the community increase, then they will exert more pressure for increased police surveillance. We expect that $\partial PSM/\partial PCH<0$.

W1 (overall wealth): Includes all real estate categories which are taxable. Hence, it expresses the financial resources available to the community. These include residential, commercial, industrial, farm and vacant lands. The wealthier a community is, the higher are the tax revenues, and the greater the demand and amount spent on all public services, including police (assuming that police services are normal goods). Also, the residents of any given wealthy community realize that wealthy housing and stores attract criminals, and thus, they should provide for a greater intensity of policing than poorer communities do. We expect that $\partial PSM/\partial W1>0$.

DU and *DS* (urban, suburban dummy variables): Given all variables which explain *PSM* as equal to all three types of communities, we expect that urban communities will spend more than suburban and rural communities. One reason for this is that urban communities enjoy various types of Federal and State grants which allow them to spend more. We expect that $(PSM)_{DU}>(PSM)_{DS}>(PSM)_{DR}$ (where *DR* designates rural communities).

The independent variables *PSM*, *DEN* and *POV* were transformed with respect to their group means. For example, the police expenditure variable was transformed to $(PSM)_U$, $(PSM)_S$, and $(PSM)_R$, where each non-zero entry appears in only one of the three variables. With this transformation we identify the independent effect of *PSM* in each group of communities (*U*, *S*, and *R*) on the various types of crime. This is achieved without breaking up the sample for the other independent variables which are not expected to exhibit different behavior (i.e., coefficient) for each group.

In the first step of model construction, the dependent variables $(B)_E$, $(L)_E$, $(RB)_E$, and $(VT)_E$ are, as mentioned above, the residuals obtained from regressing each type of these property crimes on the remaining three property crimes [eqs. (3) and (4), respectively].

The above method reflects the hypothesis that the natural rates of the various property crimes depend on the same set of structural socio-economic characteristics.

Unlike other studies we distinguish between two types of socio-economic variables; some with short-term effects and others with more permanent, long-run effects on crimes. In the short run, the crime level is affected by prevention policies and such community characteristics as income and wealth level, demographic composition, population density, etc. The rationale for this argument is that in the short-run, police operation affects crime level depending on the profile of the particular community. In the long run, however, the social and economic structural profiles which exhibit little variation over time, dictate the 'natural rate' level.

In the second step, six simultaneous equations for the short-run were estimated. They include one for violent crime, four for property crime, and one for police expenditure. Obviously, since interdependence prevails only among the property crimes, VC is not expressed in a residual form.

The data base includes two hundred and thirty communities in New Jersey for the year 1970. It includes twenty-seven urban, one hundred and fifty suburban and fifty-three rural communities. All communities have a population of 2,500 or more.

The use of cross-sectional data is most appropriate to our particular conceptual model which interrelates all property crimes. The work of Houthakker and Prais (1955) has provided a consensus that such analysis yields long-run results. Hence, the unexplained residuals emerging from the four property crime equations reflect short run fluctuations of the corresponding property crimes.

4. Results

Analysis of mean values of property crimes, police expenditure, and arrest rates (table 2) reveals the following findings. All property crimes and police expenditure when measured in standardized forms are the highest, to a substantial degree, in the urban communities and lowest in rural

Table 2
Mean values of selected variables.

	Urban communities	Suburban communities	Rural communities
Crime variables			
B	2.62×10^{-3}	1.37×10^{-3}	0.54×10^{-3}
L	144.70	61.85	14.38
RB	13.80	1.80	1.43
VT	72.64	8.62	6.63
VC	1.64×10^{-4}	1.15×10^{-4}	1.34×10^{-4}
Arrest rates variables (in %).			
AB	9.9	12.8	16.6
AL	9.1	9.4	13.9
ARB	27.4	26.1	19.4
AVT	4.4	14.8	24.1
AVC	75.4	55.6	44.0
Municipal characteristics variables			
DEN	10,858.90	4134.13	1086.86
PSM	333,197	111,095	23,859

communities. However, violent crimes do not reflect any significant difference among the three types of communities. The arrest rates are highest for property crimes in rural communities and lowest in urban communities, while violent crimes and robberies, show opposite trends. With regard to property crime: the more urbanized a place is, the higher the crime, the greater the police expenditure, and the lower the arrest rate.

Three possible observations emerge from these findings. First, police operations are less effective in both deterring and detecting crimes in the more urbanized places. Second, the proportionally higher crime rate in the more urbanized places is attributed to differences in the socio-economic profiles. These two observations lead to a third proposition implying that police outlays in urban communities are inadequate to effectively combat property criminals. Hence, the property crime level might be mainly determined by the socio-economic characteristics and only slightly affected by policing. Thus, even this unsophisticated analysis might hint at the existence of a natural rate of property crime.

This analysis is extended by a more refined statistical model. Table 3, which presents the regression results, shows that violent crimes are not explained by economic incentives. In fact, the only variable that seems to statistically explain violent crimes is poverty. The police expenditure variables appear to have the expected sign, however thay are statistically insignificant.

In the burglary equation, the police expenditure variables appear with the expected signs and are significant with the exception of rural areas. Poverty is positively, and significantly related to burglaries in both urban and suburban communities, and is insignificant for rural communities. Median home value and the percent of single-family homes represent expected payoffs and opportunities to burglaries, both of which have positive and significant coefficients. Although it is not statistically significant, the arrest rate is negatively related to burglaries.

The variables that statistically explain larcenies are the dummy variables and police expenditure. The police expenditure coefficients for urban, suburban, and rural areas are negative and significant, and in declining absolute values, respectively. The latter findings indicate a decrease in police efficiency with a decrease in urbanization.

In the robbery equation we find that the expenditure coefficients are not statistically significant for all areas. This finding could be attributed to the fact that robbery is the type of property crime which is closest in its characteristics to violent crime and hence is unaffected in the short run by policing. In urban areas, density, a measure of opportunities and of the stock of victims, is positively related to robberies.

In the vehicle theft equation, the expenditure coefficient is negative and significant as expected. Density and wealth, which are also measures of crime opportunities and of the stock of victims, are positive and significant for all

Table 3
3SLS regression analysis results.

	Violent crimes	Property crimes				Police
	VC	$(B)_E$	$(L)_E$	$(RB)_E$	$(VT)_E$	PSM
Intercept	-4.37×10^{-5} (1.620)[a]	-5.51×10^{-4} (−1.672)	−53.06 (−3.302)	1.88 (1.238)[a]	6.00 (0.828)[a]	8.56×10^{4} (1.92)
VC	—	—	—	—	—	2.91×10^{8} (1.520)[a]
PSM	—	—	—	—	-5.00×10^{5} (−5.072)	
$(PSM)_U$	-1.66×10^{-10} (−1.467)[a]	-4.36×10^{-9} (5.384)	-7.32×10^{-5} (−2.074)	-1.04×10^{-6} (0.243)[a]	—	—
$(PSM)_S$	-3.23×10^{-11} (−0.390)[a]	-2.79×10^{-9} (−5.904)	-2.00×10^{-4} (−7.719)	-3.51×10^{-6} (−1.324)[a]	—	—
$(PSM)_R$	-5.11×10^{-12} (−0.019)	-1.19×10^{-9} (−0.619)[a]	-1.77×10^{-4} (−2.12)	3.57×10^{-5} (0.323)[a]	—	—
DEN	8.06×10^{-11} (0.064)[a]	—	1.39×10^{-4} (0.347)[a]	—	—	—
$(DEN)_U$	—	—	—	0.94 (3.901)	6.86×10^{-3} (15.567)	34.20 (2.794)
$(DEN)_S$	—	—	—	-1.52×10^{-2} (−0.082)[a]	3.09 (1.970)	1.69 (0.790)[a]
$(DEN)_R$	—	—	—	0.11 (0.356)[a]	5.12×10^{-3} (4.022)	1.85 (0.134)[a]
POV	3.22×10^{-5} (8.061)	— —	1.48 (0.926)[a]	—	−0.209 (−0.358)[a]	—
$(POV)_U$	—	2.57×10^{-4} (4.557)	—	—	—	—
$(POV)_S$	—	2.81×10^{-4} (6.792)	—	—	—	—
$(POV)_R$	—	5.29×10^{-5} (0.634)[a]	—	—	—	—
PCH	—	—	—	—	—	-2.00×10^{4} (−0.883)[a]
$W1$	—	—	—	—	—	$1.95.10^{-3}$ (4.753)
$W2$	—	—	2.90×10^{-9}[a] (0.231)	1.65×10^{-10}[a] (0.129)	1.62×10^{-9} (2.372)	—

Table 3 (continued)

	Violent crimes	Property crimes				Police
	VC	$(B)_E$	$(L)_E$	$(RB)_E$	$(VT)_E$	PSM
MED	—	2.86×10^{-9} (2.719)	—	—	—	—
UN	—	—	2.00[a] (0.792)	—	—	—
SIN	—	1.18×10^{-3} (12.581)	—	—	—	—
MOB	—	1.69×10^{-2}[a] (0.189)	—	—	—	—
Y	—	—	—	—	14.95 (2.080)	—
AVC	7.09×10^{-6}[a] (0.363)	—	—	—	—	—
AB	—	-6.84×10^{-4}[a] (−1.400)	—	—	—	—
AL	—	—	−3.66[a] (−0.205)	—	—	—
ARB	—	—	—	0.296[a] (0.534)	—	—
AVT	—	—	—	—	−1.09[a] (−0.027)	—
DU	—	-6.27×10^{-5}[a] (−0.199)	45.81 (3.050)	−2.68[a] (−1.436)	33.53 (4.540)	1.46 (2.152)
DS	—	-3.54×10^{-4}[a] (−1.218)	34.70 (3.977)	−3.52 (−2.129)	−5.08[a] (0.794)	-1.55×10^{3}[a] (−0.046)
$B_{(E)}$	—	—	—	—	—	2.48×10^{7} (1.863)
$(L)_E$	—	—	—	—	—	1.80×10^{3} (1.520)[a]
$(RB)_E$	—	—	—	—	—	3.12×10^{4} (3.10)
$(VT)_E$	—	—	—	—	—	-2.48×10^{2} (−0.096)[a]

[a]Coefficient is insignificantly different from zero at the 10 percent probability level. Numbers in parentheses are t-statistics. $(B)_E$, $(L)_E$, $(RB)_E$ and $(VT)_E$ are the differences between fitted and actual values found by regressing each property crime on the remaining three. The following original variables have been scaled: L and RB were multiplied by 1000; VC was multiplied by 10,000.

three types of communities. The supply of potential criminals is also positive and significantly related to vehicle thefts.

The police expenditure equation results are as expected. All but vehicle thefts show positive and significant effects upon expenditures.

Interestingly, however, among all crimes, violent crimes exhibit a greater effect on the allocation of police outlays than property crimes do. This seems to be an irrational policy since such crimes are, according to our crime equations, unaffected by policing. However, the logic of such a relationship might be that the public is more concerned with violent crimes than with property crimes, and as a result exerts more pressure on the local politicians to increase surveillance when violent crimes occur.

The ability to pay also had a positive and significant effect on police expenditure. Density had a significant effect only for urban areas. This may be due to the fact that suburban and rural areas have such low densities that more people per square mile do not raise surveillance costs appreciably. The more unstable the population, the less is spent on policing. This reflects the fact that the longer people live in the community, the more concerned they are about their needs for security. If we assume that all other independent variables are constant, we find that urban communities spend more on policing, yet still suffer from a significantly higher level of both larcenies and vehicle thefts than do suburban and rural communities.

5. Conclusions and implications

This study confirmed our hypothesis that certain levels of all property crimes are affected only in the short run by existing police operations. The main reason is the high net returns on these crimes which do not make existing police operation and quality of performance a deterring factor. The total amount of police operations merely deters marginal crimes, i.e., those crimes with low expected net return.

To date, most empirical evidence based upon cross-section data does not reveal the deterrent effect of the level of policing on crime. However, our study which empirically considers the possible existence of a natural rate of property crimes does reveal the deterrent effect of policing. Police presence exhibits a short-term relief of property crimes, however, it does not reduce the long-run overall level of criminal activities.

Another related finding of this study shows that police activities (input), rather than its performance, as indicated by the arrest rates (output), deters property criminals.

The relative success of police in deterring crime has been compared among urban, suburban, and rural communities. The results indicate that police activities in urban communities might be more effective than in the other two types of communities. We further found that regarding police activity, urban communities spend three times the standardized amount spent by the suburbs and fourteen times the amount spent by rural communities. These two findings suggest that police operations might enjoy increasing returns to scale, resulting from high level of fixed costs.

Although more case studies should be conducted to further refine the findings of our research, several policy implications emerge. Policy-makers allocate police resources based upon the level of violent crime, and to a lesser degree upon all property crimes excluding vehicle theft. However, violent crime does not respond to police activity, a result confirmed in major criminology studies. Hence, budgetary police decisions are probably dictated to the greatest extent by the level of violent crime undeterred by police, and less by rational decisions. Preferably, police expenditure should respond to the levels of property crimes which are sensitive to police activity. By doing so, policy-makers would follow the logic of cost–benefit considerations and of maximizing the net return on police outlays.

In order to increase social net benefits, more should be spent on policing in urban places even at the expense of suburban and rural places. This might lead to the largest reduction in overall property crime regardless of the fact that urban places already spend much more on policing.

The most important result of this study is that the bulk of property crime is unaffected by police activity. The amounts that can be allocated by the public on policing cannot radically reduce crime. Thus, the public should consider the possibilities of converting the allocation of resources from crime prevention to crime corrective measures, which attack the causes of criminal motivations rather than their symptoms [Hakim and Rengert (1981, pp. 7–17)]. The natural rate of property crime, which is independent in the long run of police surveillance can only be reduced by correcting the ills of society. Hence, more resources should be directed towards programs that affect the social structure and specific corrective programs which are aimed at potential criminals than on mechanical measures like policing which has marginal effect on crime levels.

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